Countering Asymmetric Threats in the Littoral Maritime Environment

Joachim Kimpel
Federal Office of Defense Technology and Procurement
F-Sauerbruch-Str 1
56073 Koblenz
GERMANY
Tel: +49 (0) 261 400 4292

joachimkimpel@bwb.org

SLIDE 1

Ladies and Gentlemen,
I would now like to give a presentation on the topic "Countering asymmetric threat in the maritime and littoral environment".
The term asymmetric threat covers the threat posed by asymmetric warfighters as well as the threat caused by terrorists.
Recent events show that the topic is now more of topical interest than ever.

SLIDE 2

Who am I?
My name is Joachim Kimpel. I work for the Federal Office of Defense Technology and Procurement (BWB). In my capacity as an engineer, I am part of the project group "Technical Support" for naval projects. Within the project group I am, among other things, responsible for the fight against asymmetric and terrorist threats.
Before this, I served as a soldier of the German Army for a period of twelve years.

SLIDE 3

Table of Contents
My briefing is organized as follows:
- First of all, I would like to give you a short introduction into the subject
- In the second section, I will briefly illustrate the critical locations
- In part three of my presentation, I will give an overview on how a possible threats might look like
- In the fourth part, I will focus on the problems which arise in connection with the threat
- And in the final part of my presentation, I would like to present possible solutions

SLIDE 4

I would like to begin my presentation by quoting a line from Friedrich Dürrenmatt's play "Die Physiker".
September 11, 2001 has shown that even the unthinkable can become reality. We have to reconsider our strategies for countering threats.

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The changes in the political landscape following the disintegration of the Warsaw Pact at the end of the last century brought about new operational scenarios for the naval forces of most NATO nations.

Until the late 80s, naval forces had been equipped at their own expense and only for national defense purposes and blue water operations such as the protection of sea lines of communication, but meanwhile its spectrum of tasks has changed considerably.

Today, armed services are deployed on UN and NATO peace missions all over the world. However, the nature of these missions and the threats necessitating them are totally different from those of the days of the East-West conflict.

Whereas, in the past, it was relatively easy to assess one's opponent in a potential conflict – because of the "equality of arms" principle – the spectrum of tasks and operations to be expected today ranges from so-called asymmetric conflicts between unequally equipped and totally different operating armies or campaigns against guerilla-type militias to peace-keeping or peace-enforcing operations abroad.

All theses types of asymmetric threats are characterized by the need for good camouflage, covert action and surprise. This often happens against a civilian backdrop, where international rules of engagement are intentionally ignored.

Forces with inferior equipment which operate asymmetrically may well be successful against a better-equipped conventional army or navy and win conflicts by focusing on exploiting enemy weaknesses or by defining more targets than the opponent can adequately protect, or by launching surprise attacks that are limited in time and location.

Asymmetric attacks do not respect any time limits or geographic and political boundaries.

Furthermore, countermeasures against such attacks are complicated by the fact that terrorists are usually determined to do anything that serves their purpose and even accept having to die for it.

SLIDE 5: CRITICAL LOCATIONS(1)

Let us now focus on threats in littoral waters. The most important ones are the heavily congested sea areas. Some of these areas are also marked by lively tourism.

By way of example, I would like to mention the Strait of Gibraltar whith a high percentage of trade traffic between east and west and tourist traffic circulating between north and south. The Straits of Malacca, the English Channel and the Bab El Mandeb are further examples in kind.

SLIDE 6: CRITICAL LOCATIONS(2)

Bridges are particularly dangerous since they allow the enemy to approach the target rapidly and under cover. The possibilities to make use of sensors and effectors are limited because of steep angles.

SLIDE 7: CRITICAL LOCATIONS(3)

Canals and narrow fairways are among the critical areas since the ability to manoeuvre is restricted and allows the enemy to do covered approaches.

SLIDE 8: CRITICAL LOCATIONS(4)

All over the world there are steep coasts where naval forces are being deployed in these coastal regions. In these areas, sensors and effectors have extensive dead sectors which allow the enemy to seek defilade.

SLIDE 9: EXAMPLE OEF

A recent example is the Operation Enduring Freedom. All these danger spots are represented in OEF.

When protecting naval units in ports and roadsteads we are faced with almost all of these problems and solutions.

SLIDE 10: WHAT'S NEW TODAY?

Asymmetric threats are not new, they have been known throughout history. Examples are the Résistance movement in France, partisan warfare in Russia and Yugoslavia, the Vietminh and Viet Cong in Vietnam, the Mujahideen in Afghanistan fighting against the Soviet Union, or the Taliban and other Iraqi groups fighting the US troops.
Examples from the maritime field are the Tamil Sea Tigers or the battle between the Dutch Sea Beggars (Gueux de Mer) and the Spanish Navy in the 17th century.
In maritime environments, there are also numerous examples of asymmetric warfare or threats to quote. These attacks or threats are not only directed at military targets, such as the US destroyer "Cole" or the latest missile attack on US troops in the Gulf of Aqaba and the rocket attack against the Israel Korvette "Hanit", but also at civilian ships or civilian establishments – such as the hijacking of the "Achille Lauro" or the attack on the oil tanker "Limbourgh".

In a symmetric conflict, we know our opponent. He is designated as such. Many weapon systems have signatures which we are able to detect and identify with the help of our sensors.
Today, in asymmetric conflicts, we do not know our opponent. Our opponents use unfair methods and are often protected by civilian groups or relief organizations such as the Red Cross. And our enemy is not necessarily interested in surviving the operation.

SLIDE 11: NAVY TASKS IN THE LITTORALS

- Surveillance and control of extended sea areas and sea lines of communication
- Embargo control
- Escorting
- Monitoring cease- fire agreements
- Separation of conflicting groups/parties
- Defense of locally limited attacks
- Countermeasures against asymmetric warfare

SLIDE 12: WHAT DOES THE ENEMY LOOK LIKE TODAY?

Our new enemy acts in all different areas to threaten us:
- underwater attacks
- surface attacks
- and above water attacks

SLIDE 13: SURFACE TARGETS

This includes all conceivable maritime vessels on the oceans.
- Yachts
- Work platforms
- Merchant vessels
- Speedboats
- or small boats for trade or fishing varying from region to region

SLIDE 14: LAND TARGETS

My definition of land targets includes all weapons which may be fired from the ground against naval units. It is particularly important to mention that many of these weapon systems can be fired from floating platforms, too.

- As a classical weapon for short distances RPG-7
- ballistic missiles such as the Katyusha rocket
- or vehicle mounted weapons
- The attack of the Hanit represents a new quality.
- It was the first time that asymmetric warfighters fired guided missiles from the ground.

SLIDE 15: AIR TARGETS

Small size aircraft should be given special mention. Nevertheless, large aircraft should also be taken into account as we learned from 09/11. As regards small size aircraft, problems from the past have changed. What used to be a false target might well be a threat today.

SLIDE 16: SUBSURFACE TARGETS

There is a variety of options for underwater attacks.

- Mines
- Divers with delivery vehicles
- Mini and diminutive submarines, as were to be procured by the Tamil Tigers.
- IED (Improvised Explosive Devices)

SLIDE 17: PROBLEM IDENTIFICATION

The main problem faced with when fighting against asymmetric warfighters is to recognize a threat. A terrorist or asymmetric warfighter makes use of a civilian environment offering ideal cover. This leads to shortened engagement times. Our opponent may only be detectable once he has reached close range.

SLIDE 18: COMPLEX PROBLEMS

This section shows the importance of reliable identification.
In ports and littoral waters we have to deal with various and differents areas. In this environment, it is not only difficult to identify the opponent but also the employment of weapons poses problems since the risk of collateral damage is very high.

SLIDE 19: PROBLEMS WITH SENSORS

Whereas in the past, it was the purpose of all developments in the field of sensors to detect and identify the opponent from a large distance, this continues to hold true today, but, addtitionally, modern sensor technology must enable us to sensor tracks at very close range in order to protect the immediate environment of our own platforms.
We need good a priori knowledge of our opponent to effectively counter the threat.
The following example serves to illustrate this point:
Imagine you bought ten puzzles containing a thousand pieces each. Put all the pieces in a box, stir carefully and then take a couple of handful and throw them into a fire. Afterwards, ask somebody to tell you which pieces you threw into the fire. This is a task which is probably unsolvable.

If you had provided a master copy for this task, the problem could have been solved easily.
It must be our aim to establish such a master copy that enables us to evaluate information adequately.

SLIDE 20: PROBLEM EFFECTORS

Basically, what is true for sensors also holds true for effectors. Classic weapons were designed to have effect at large distances.
Another aspect which is new is the employment of non lethal weapons to keep up the escalation dominance serving as an indicator for a threat. Those who do not react adequately on the use of non lethal weapons should be considered suspect.

SLIDE 21: SIGNATURES

We do not have the means to protect ourselves against simple weapons of terrorists and asymmetric warfighters.

SLIDE 22: SOLUTION IDENTIFICATION (1)

We need good a priori knowledge of our opponent. Therefore we have to analyse how a threat is being built up. By doing so, we might be able to recognize opponents before they harm us.
To give an example, we need to know what a boat has to look like to serve as a launch platform for guided missiles. Having acquired this knowledge, we can conduct a selective search for threats.

SLIDE 23: SOLUTION IDENTIFICATION (2)

In order to be able to detect the opponent it is inevitable to have a continuous and complete surveillance of our own environment. Our aim is to recognize striking features from the behaviour shown during all contacts. This is possible with the help of the EADS procedure EAGLE (Extended ATR for Generic Littoral Environment).
The system is based on neural networks and offers operator support for the detection of suspicious contacts.
The system should support the operator by automatically selecting the target.

SLIDE 24: COMPLEX SOLUTIONS

For operator support purposes a 3D Tactical Display Area (TDA) shall be used. The different sectors for weapon deployment, surveillance areas and sectors with a high risk of collateral damage are indicated to the operator. Additionally, shadowing of sensors and effectors are easily recognized in 3D mode and thus adequate counter measures can be taken.

SLIDE 25: SOLUTION FOR SENSORS (1)

With regard to sensor systems, imaging sensors gain new importance. They are indispensable particularly at very close range.
A sensor suite might comprise:
- Radar (X-band) for high resolutions of small targets
- EO/IR panorama sensors (360°) starting at a distance of 5m for surveillance
- EO/IR sensors for verification

- EO/IR sensors in small caliber machine guns
- Laser warning device
- UV warning device for the detection of launched missiles
- Multi-Frequency sonar for the detection of divers and underwater situation pictures
- Autonomous underwater vehicle / unmanned surface vehicle

SLIDE 26: SOLUTION FOR SENSORS (2)

This is an example of a 360° panorama sensor. This is the system SIMONE (Ship Infrared Monitoring, Observation and Navigation Equipment)

SLIDE 27: SOLUTION FOR SENSORS (3)

Yet another example of a Rheinmetall IR panorama sensor "First".
Here you see a 360° panorama with two sections automatically displayed to the operator in case of a threat.

SLIDE 28: SOLUTION FOR SENSORS (4)

To detect land-based weapons equipped with a telescope unit, it is necessary to employ a sniper detection system.

SLIDE 29: SOLUTION FOR EFFECTORS (1)

A substantial number of effectors is needed to counter terrorist or asymmetric threats. The employment at very close range and the use of non lethal effectors is of particular importance:
Their employment requires careful planning and shall be supported by the Command Direction System. It is to be avoided that the employment of non lethal effectors rules out the employment of lethal effectors.
A possible combination of effectors might comprise:

- Self defense systems against guided missiles like RAM or Phalanx
- Automatic small caliber machine guns from 12,7mm to 40mm against small highly mobile targets
- 40mm grenade launcher (also for non lethal ammunition)
- HPM (High Power Microwave) as non lethal and lethal weapon
- Decoy launcher
- Water cannons
- Searchlights
- Acoustic devices
- Autonomous underwater vehicle / unmanned surface vehicle

SLIDE 30: SOLUTION FOR EFFECTORS (2)

This is an example on how to improve the effectiveness at very close range. The two position pedestal offers the possibilty to operate at close range of the platform.

SLIDE 31: SOLUTION SIGNATURE

As a matter of course, the same measures should be taken into account as for symmetric threats. Cold smoke may be used to restrict the opponent's view. However, the smoke has to be "transparent" for friendly forces.

SLIDE 32: SOLUTION SIGNATURE

This is an example of cold smoke produced by Rheinmetall. You see that the helicopter is not able to do a landing approach.

SLIDE 33: SOLUTION FOR AUV / USV (1)

The employment of remote sensor pictures is indispensable in certain theaters of operation. Due to shadowing, friendly sensors are not able to provide data for a situation picture. This is where AUVs (Autnomous Underwater Vehicle) and USVs (Unmanned Surface Vehicle) are brought into action.
These sensor platforms may be equipped with different sensors for many different uses.
By way of example, I would like to mention the escorting and surveillance of a steep coast.

SLIDE 34: SOLUTION FOR AUV / USV (2)

Further examples for AUVs and USVs
   •   Seaotter, Seawolf and Seafox manufactured by Atlas Elektronik in Bremen.
        These AUV have the capability to detect and identify underwater targets. Furthermore, Seafox version C can be used for the destruction of mines.
   •   The Seewiesel produced by Veers in Kiel is intended to be a surface sensor platform.

SLIDE 35: F125

One of the tasks of the new German Class 125 Frigates is the protection against asymmetric threats.

Federal Office of Defense Technology and Procurement

Countering Asymmetric Threats in the littoral Maritime Environment
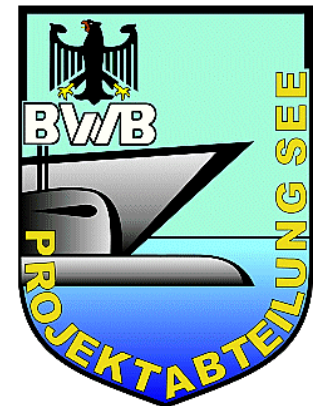
Who am I ?

• My name is: Joachim Kimpel

• I come from: Federal Office of Defense
                    Technology and Procurement
                    Koblenz / Germany

• My Job is: My task is the preparation of navy projects among other things the engineering of systems against asymmetric and terroristic threats.

Breakdown:

- Introduction

- Danger areas

- Problems

- Solutions

- Discussion

The once thought can´t be taken back no more!

Friedrich Dürrenmatt: The Physicists

Danger places (1) Regions of high traffic

The Channel
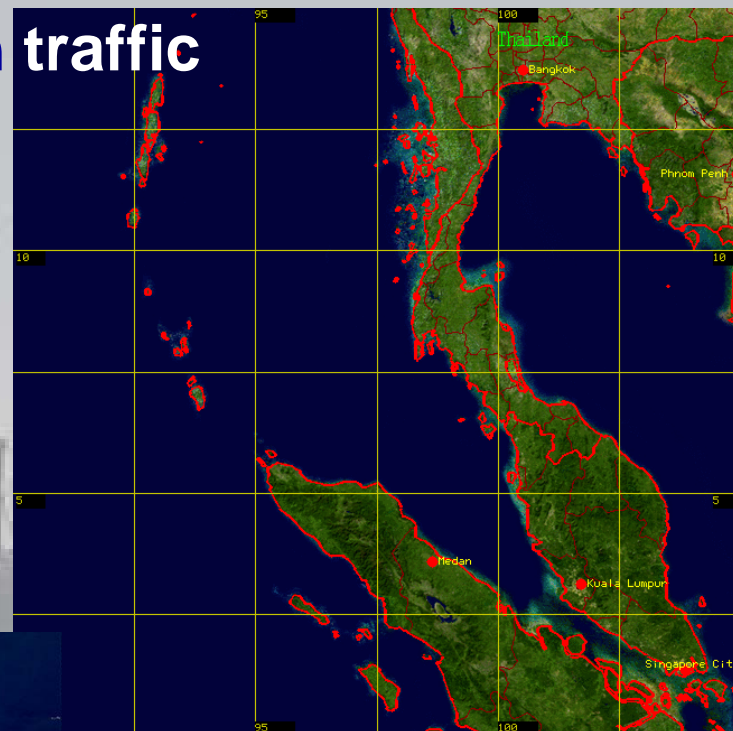
Strait of Malakka

Strait of Gibraltar

Danger places (2) Bridges

Danger places (3) Channels

Danger places (4) Cliff Lines
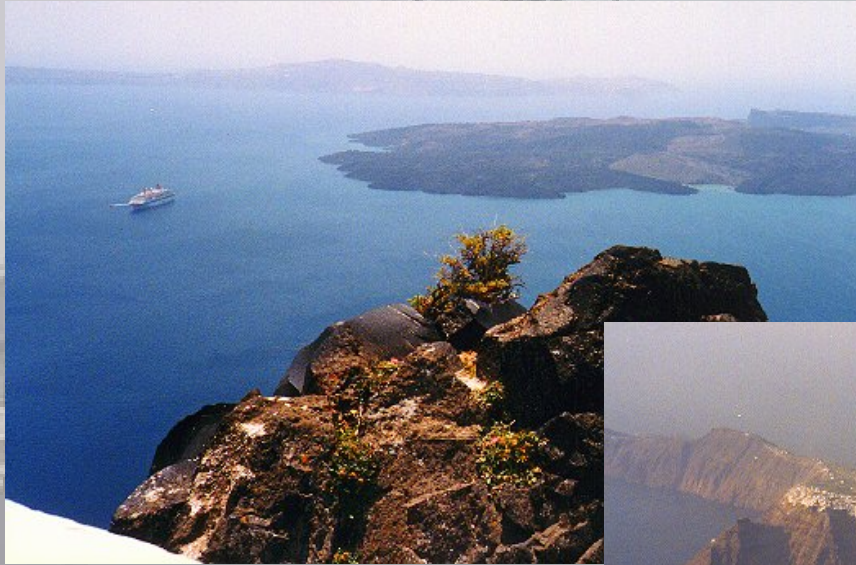
Example: OEF
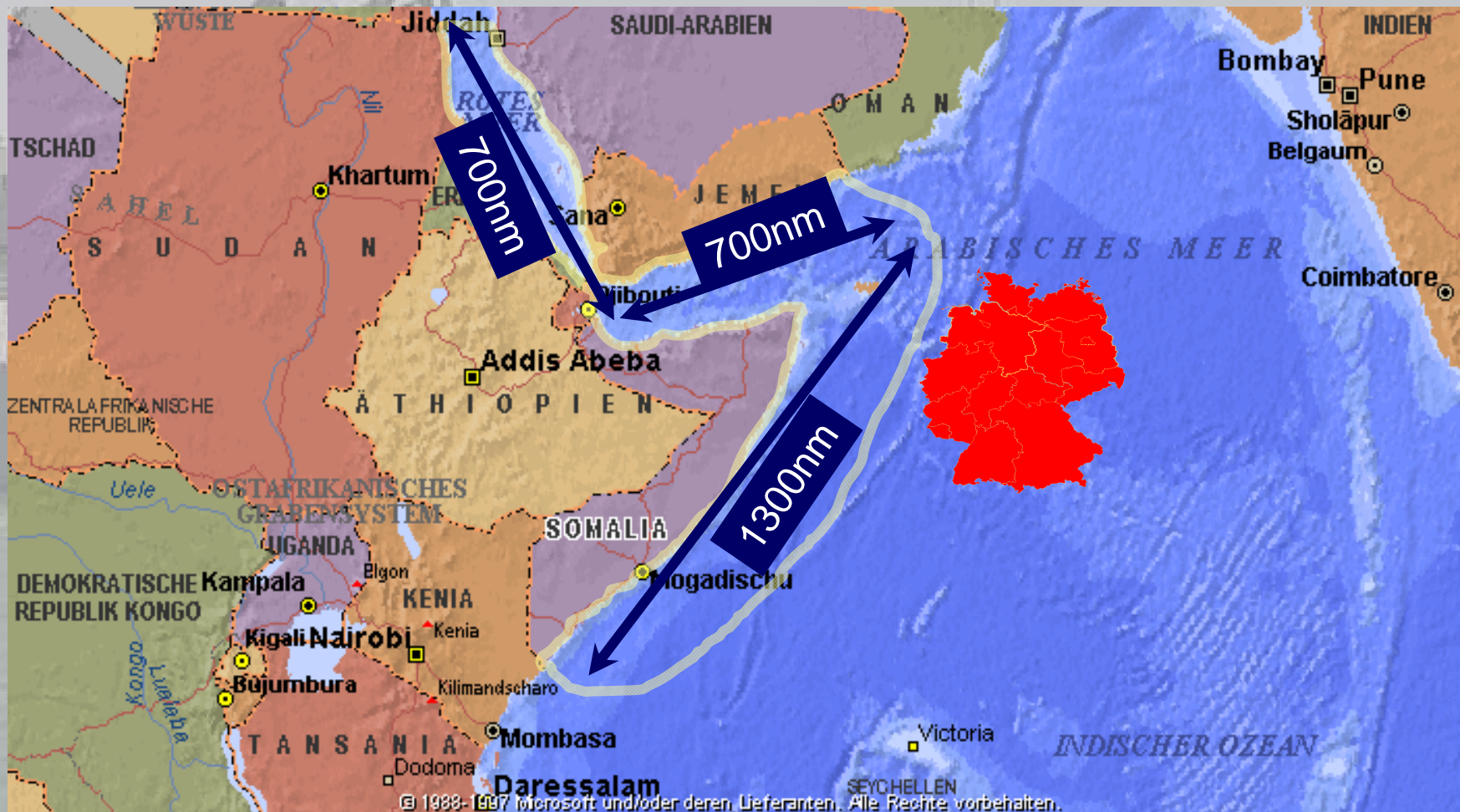
What´s new „today"?

Yesterday:

Symmetric threat:
- We knew our enemy.
- The Enemy fought with „fair means".
- We could detect him in time.

Today:

Asymmetric threat:
- The Enemy is unknown.
- The Enemy fights not according to the „warrules"
- The Enemy could be a suicide bomber

Navy tasks in the littorals are as follows:

- Surveillance and control of extended sea areas and sea lines of communication

- Embargo control

- Escorting

- Supervision of cease- fire treaties

- Separation of conflicting groups/parties

- Defense of locally limited attacks

- Defense against asymmetric warfare

What does the enemy look like today ?

Surface targets :

Land targets :

Air targets :

Subsurface targets :

Threat distances for surface targets

Boats with high explosives

RPG7 Sniper

antitank missile unguided Missile

Guided missiles

100m

500m

5000m

Problem : Classifikation / Identification

The technical dilemma

Technologies cannot clear up or recognize intentions !!!

Problem : complex areas

Industrial area

Civil landing stage

bridge

Yachting Club

Urban area

Problem : Sensors

- no suitable sensors for safe identification

- no suitable sensors for very short range

- no A priori knowledge over activities and intentions of our opponent

Problem : Effectors

- **no suitable weapons for very short distances**

- **no graduated effects against an enemy**

- **no possibility of the escalation in the weapon delivery against our enemy**

Problem : Signature

- **no possibility of camouflage against simple weapons like a Katjuscha or RPG7**

Solution : Classifikation / Identification (1)

- **We need to know a good A priori about our opponent**

- **We have to look for special developments**

- **We need a inteligente signal processing, which supports the operator**

Solution : Classifikation / Identification (2)
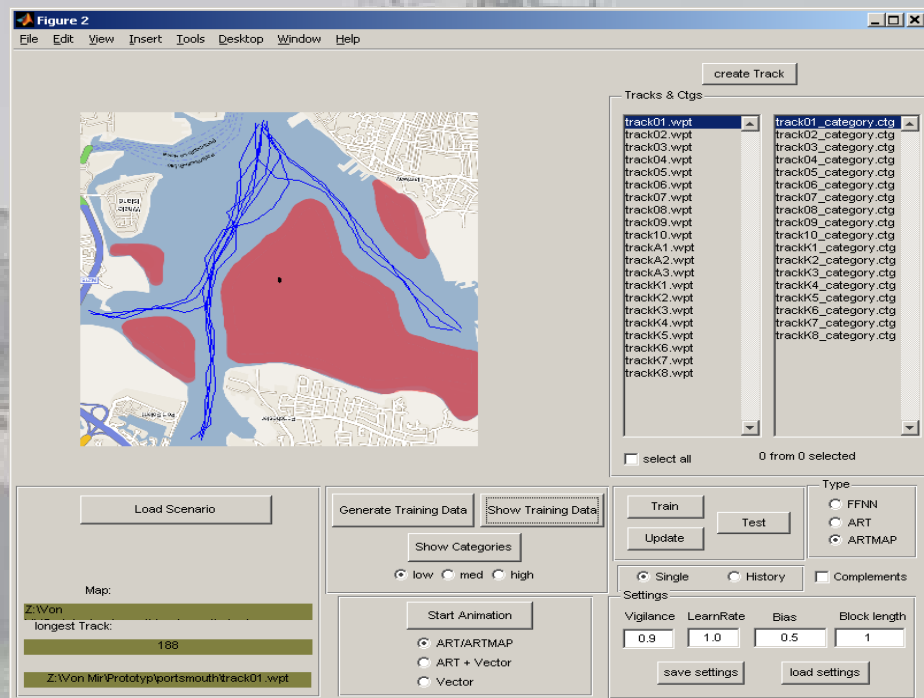
EAGLE

Extented ATR for Generic Littoral Environment
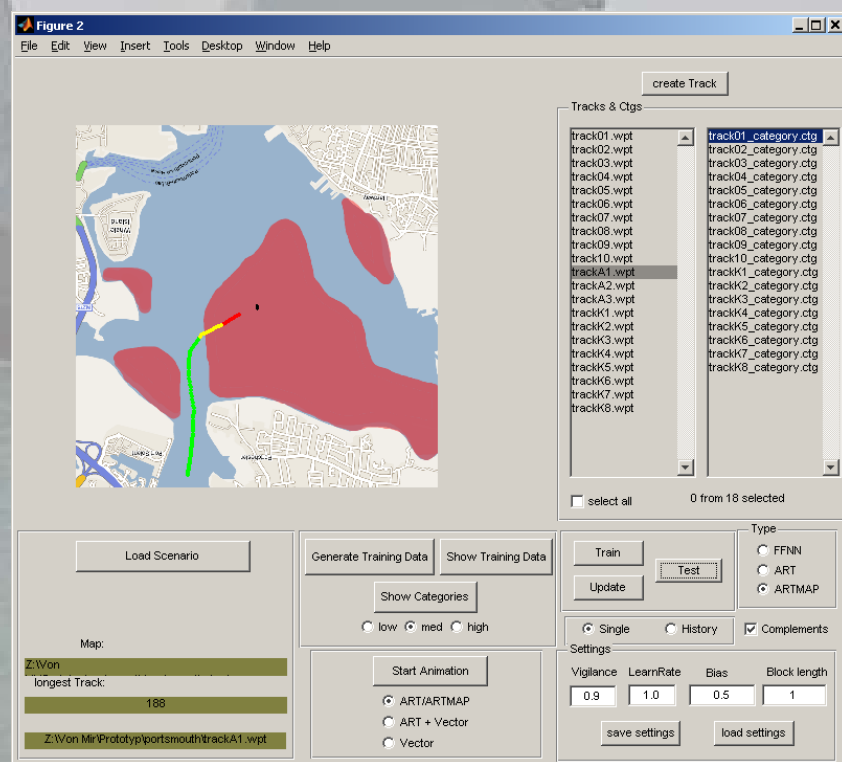
Based on Feed-forward Neural Networks

EADS
DEFENCE
& SECURITY

Solution : Complex Areas
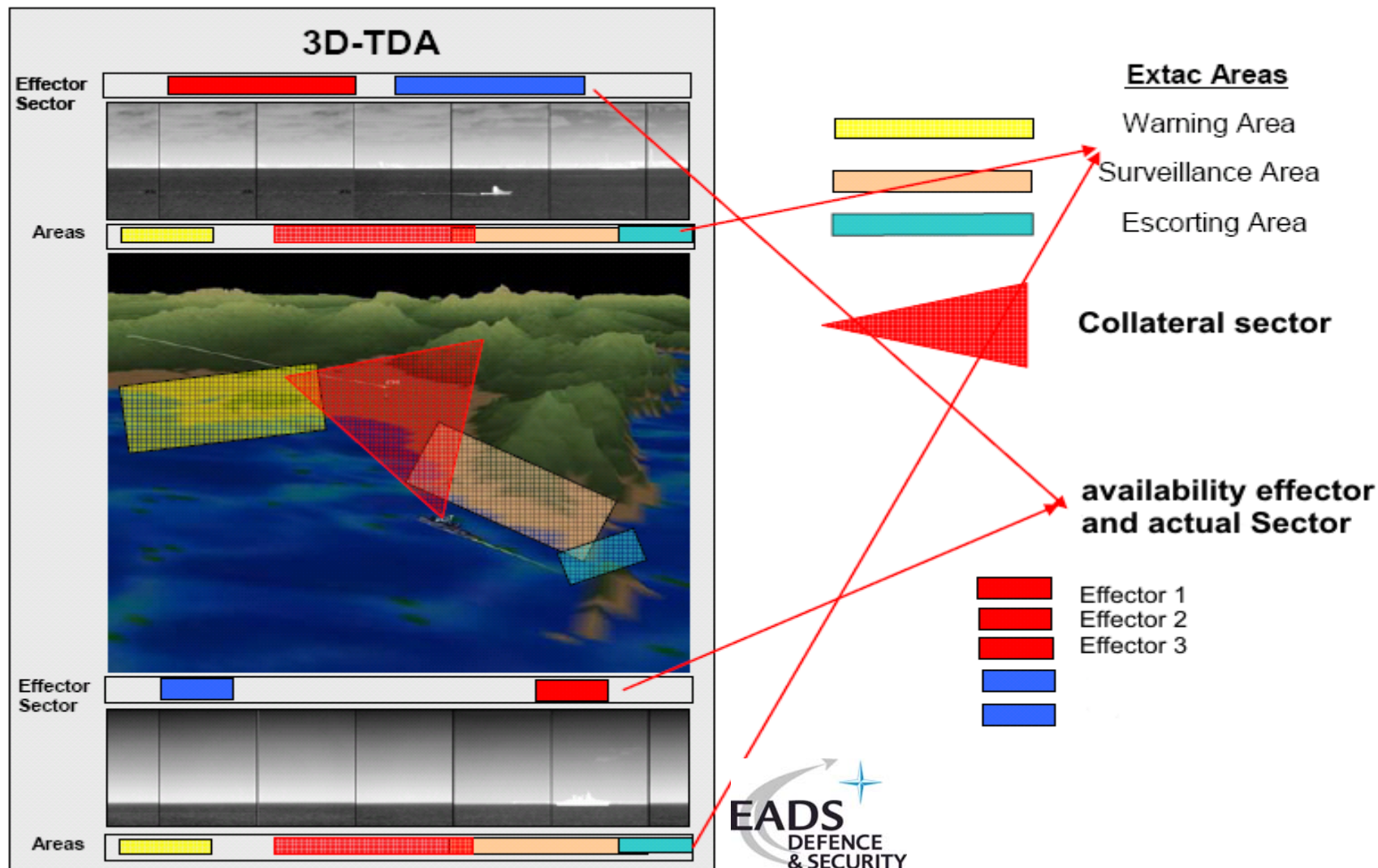
Solution : Sensors (1)

- Radar (X-Band)

- EO/IR- Panorama Sensors (360°) up from about 5m

- EO/IR-Sensors for verification

- EO/IR-Sensors in small caliber machine guns

- Laser warner

- Multifrequence Sonar
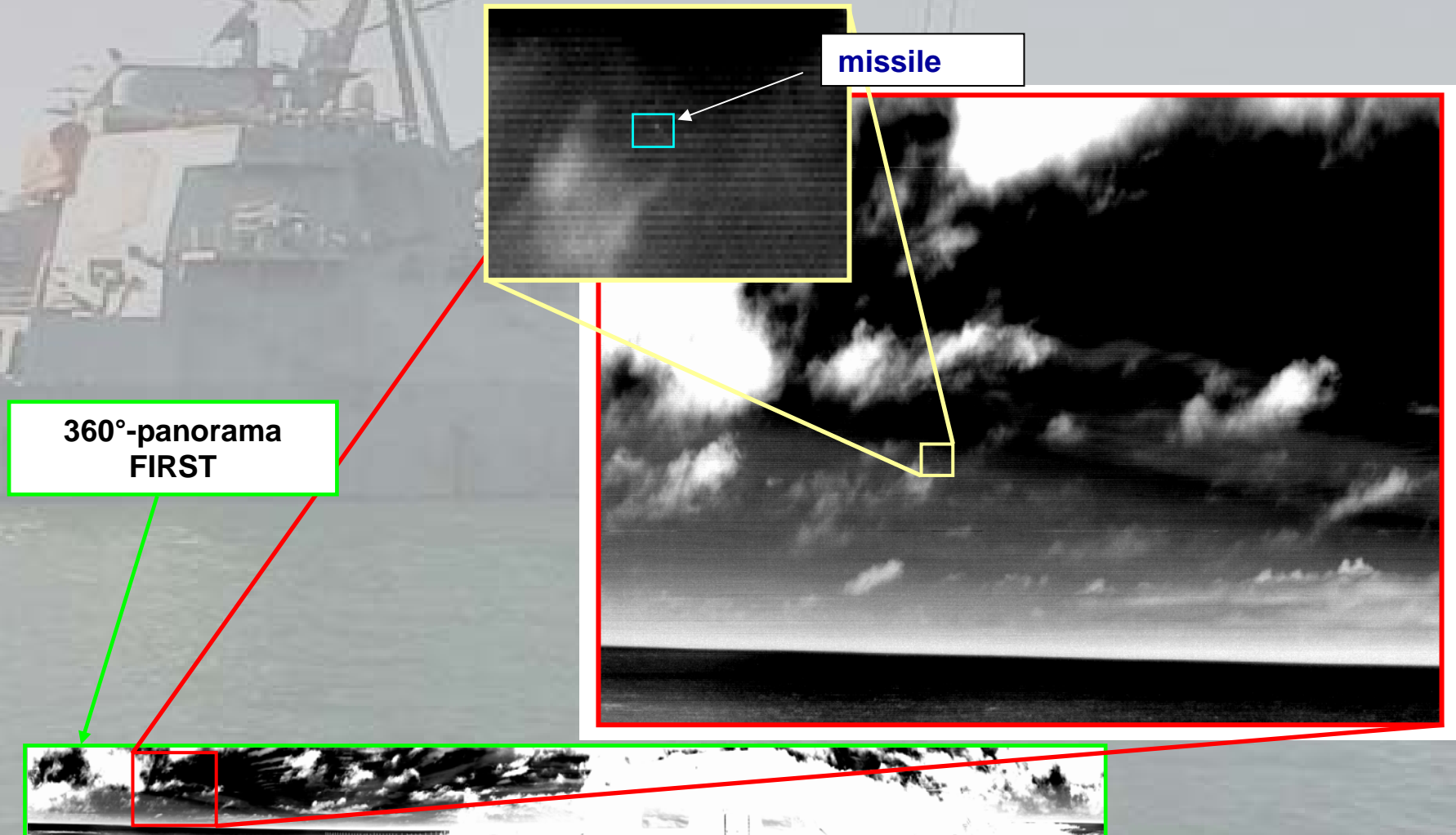
- AUV´s / USV´s

Solution : Sensors (2)
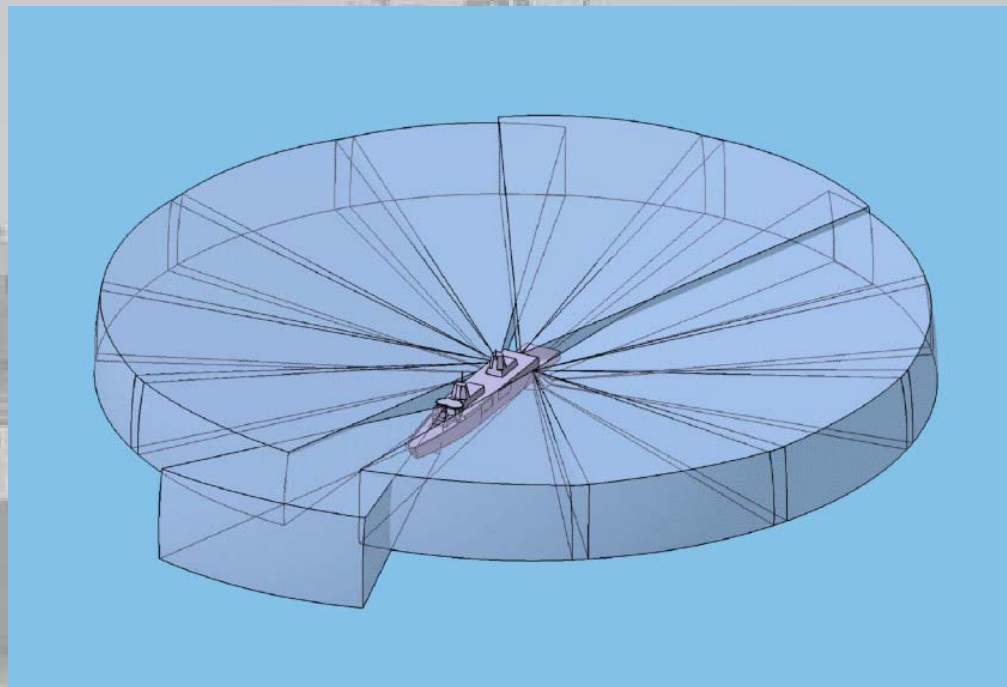
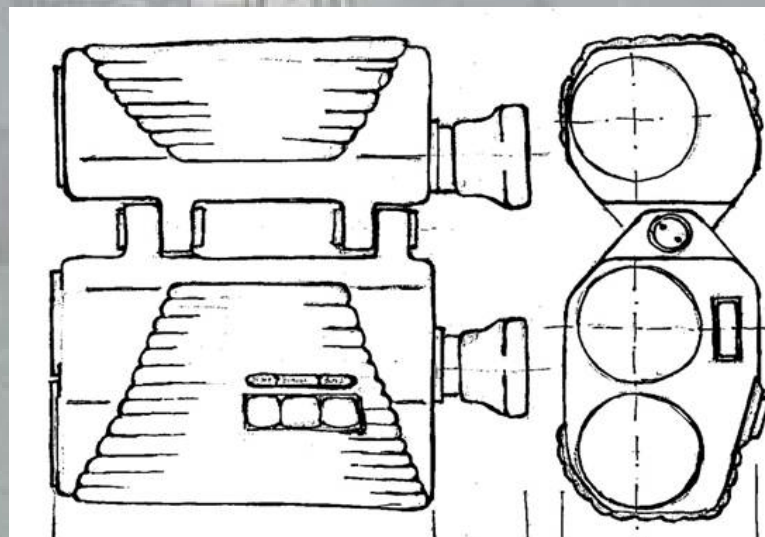## 360° Panorama Sensor
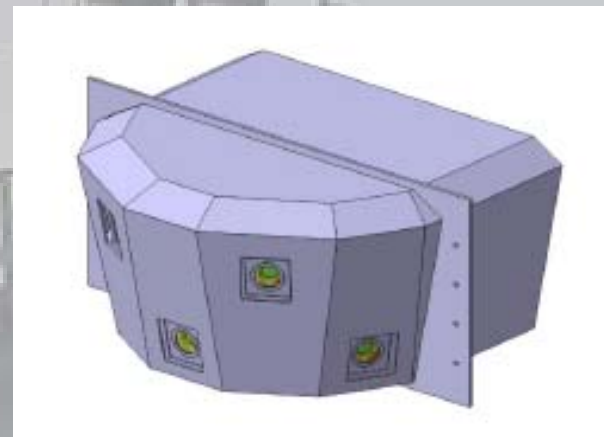
Simone by Diehl BGT Defense

Solution : Sensors (3)

missile

360°-panorama
FIRST

Rheinmetall Defense Electronics

Countering Asymmetric Threats in the littoral Maritime Environment
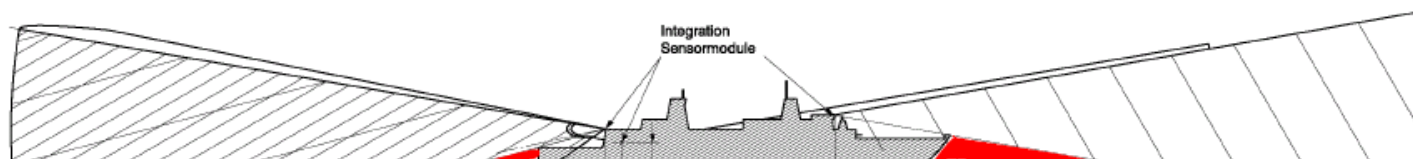
Solution : Sensors (3)

• Detection of Optics and fire control systems before the first shot

• Detection Range up to 2000 m, dependant on target

Rheinmetall Waffe Munition GmbH

Solution : Effectors (1)

- Self defense systems against rockets like RAM or Phalanx
- automatic small caliber machine guns from 12,7mm til 40mm
- 40mm grenade launcher (also for non lethal amunition)
- decoy launcher
- Water guns
- Searchlights
- Accoustic devices
- AUV `s / USV´s
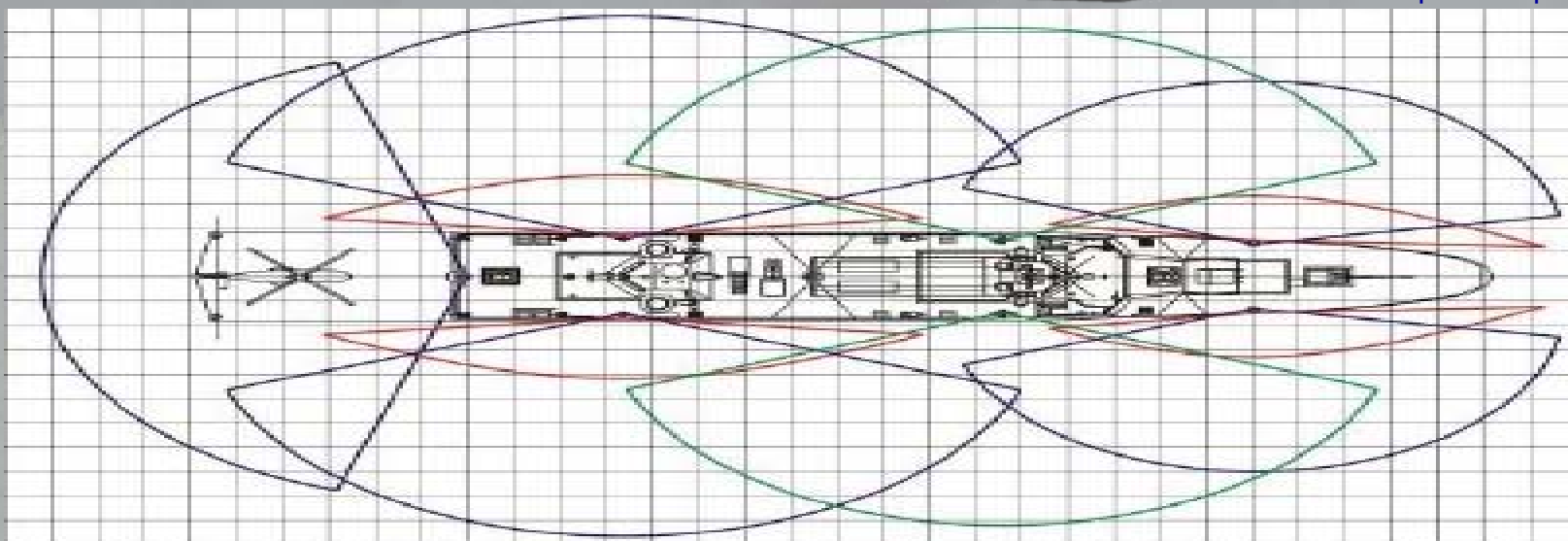
Solution : Effectors (2)

HMG Mod 517 OTO Melara
with two position pedestal

Dead sectors

Solution : Signature (1)

IR   => Minimize Hot/Cold Spots

Radar   => Reduce RCS

Magnetic   => Installation of a magnetic self protection
                              device

Acoustics   => Create a silent ship

Visual   => Installation of Decoy-Launcher and
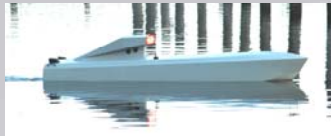   cold fog

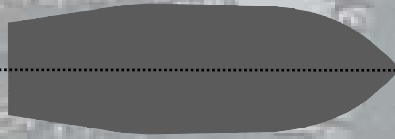# Solution : Signature (Cold Fog)
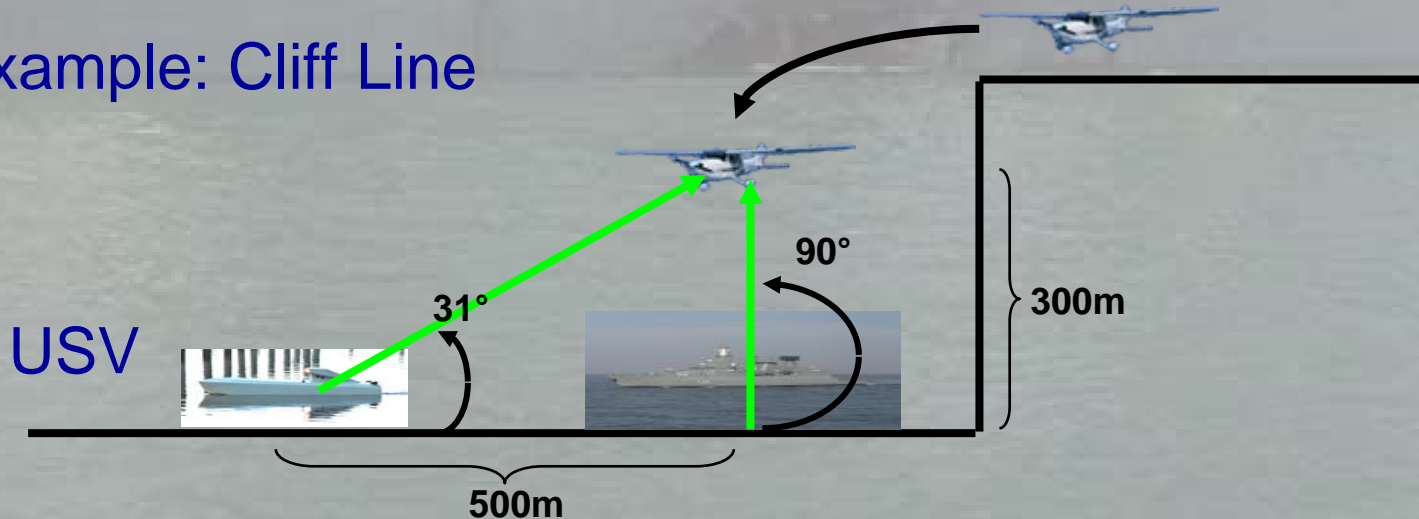

Rheinmetall Waffe Munition GmbH

Solution : AUV /USV (1)

USV 1

Example: Escorting

USV 2

Example: Cliff Line

USV

31°

90°

300m

500m

Solution : AUV /USV (2)

Seaweasel by Fa. Veers Kiel

Solution : AUV /USV (3)

Autonomous Under Water ISR

AUV- SeaOtter MK II

UW-Communication

Communication Mast

Forward Looking Sonar

SeaOtter MkII

**TV and
Headlight**

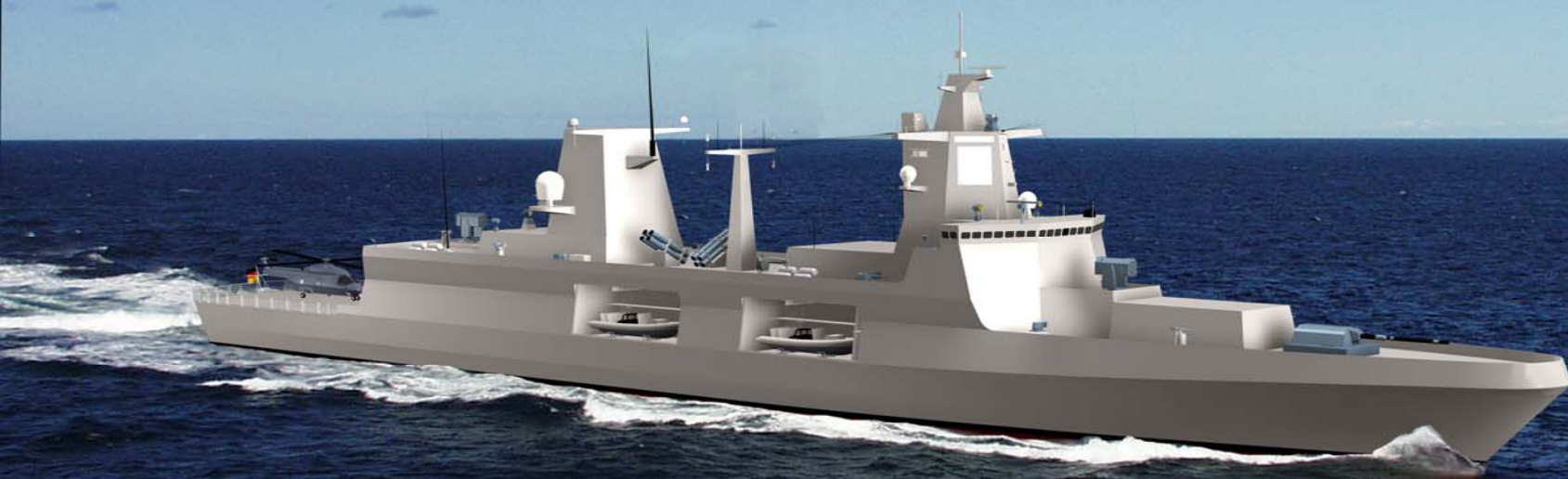**Side Looking Sonar
Synthetic Aperture Sonar**

Atlas Elektronik Bremen **Multi Beam Echosounder**

The new German Frigate F125 Artists Impression

Copyright: ThyssenKrupp Marine Systems

Thank you for your attention!